6.2 Rational Exponents

p. 352- 361

Evaluate a Radical by Inspection
p.353

i) $\sqrt[3]{8} \rightarrow 2\times2\times2 = 2$

$\sqrt[4]{16} \rightarrow 2\times2\times2\times2 = 2$

$\sqrt[3]{-125} \rightarrow -5\times-5\times-5 = -5$

note - root only evaluates for odd value roots

$\sqrt{16}$ - when root is not identified → square root

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Evaluate using a Calculator p. 354 (evaluate to two decimal places)

$\sqrt[3]{614} = 8.50$

$\sqrt[4]{1096} = 5.75$

$\sqrt[5]{-32} = -2.00$

y^x

2nd y^x = $x\sqrt{}$

TI83 MATH

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Evaluate a Power with a Rational Exponent p. 356
(unit fraction)

$8^{1/3} \Rightarrow \sqrt[3]{8} \Rightarrow 2$

$125^{1/3} \Rightarrow \sqrt[3]{125} \Rightarrow 5$

$32^{1/5} \Rightarrow \sqrt[5]{32} \Rightarrow 2$

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Evaluate a Power with a Rational Base
p. 357

$32^{2/5} \quad \left(\sqrt[5]{32}\right)^2 = 2^2 \Rightarrow 4$

$81^{3/2} \quad \left(\sqrt{81}\right)^3 = 9^3 = 729$

$27^{4/3} \quad \left(\sqrt[3]{27}\right)^4 = 3^4 = 81$

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Example 6 **Apply Rational Exponents**

A water tower supports a spherical holding tank with a volume of 500 m³. The radius of the tank, r, can be determined by the formula $r = \left(\frac{3V}{4\pi}\right)^{\frac{1}{3}}$, where V is the volume. Determine the radius of the tank to the nearest tenth of a metre.

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Example 6 **Apply Rational Exponents**

A water tower supports a spherical holding tank with a volume of 500 m³. The radius of the tank, r, can be determined by the formula $r = \left(\frac{3V}{4\pi}\right)^{\frac{1}{3}}$, where V is the volume. Determine the radius of the tank to the nearest tenth of a metre.

$V = 500$

$r = \left(\frac{3V}{4\pi}\right)^{1/3}$

$r = \left(\frac{3(500)}{4\pi}\right)^{1/3}$

$r = \left(\frac{1500}{4\pi}\right)^{1/3}$

$r = \sqrt[3]{\frac{1500}{4\pi}}$

$r = \sqrt[3]{\frac{1500}{12.56}}$

$r = \sqrt[3]{119.43}$

$r = 4.92\text{m}$ $r = 4.9\text{m}$

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Key Concepts

- In radical form, the nth root of a number is indicated by $\sqrt[n]{b}$. If no index is written, it is understood to be 2 (a square root).
- In exponential form, the nth root of a number is indicated by $b^{\frac{1}{n}}$. $\sqrt[n]{b} = b^{\frac{1}{n}}$
- To evaluate a power of the form $b^{\frac{m}{n}}$, take the nth root of b and find the mth power of the result. $b^{\frac{m}{n}} = (\sqrt[n]{b})^m$
- A scientific or graphing calculator can be used to determine approximate values of roots and radicals.

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Hmk. p. 359 -361
q. 1-7, 11 & 12*

Mar 8-7:37 AM